

Peter Daronco

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Sent: Wednesday, February 23, 2005 2:18 PM
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Office of the Secretary

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Facts and Figures RHK News Outlook
on Proximity... -- Special Re...

Peter:

We've looked high and low for an "ultimate" source for the statistic about fiber connectivity, and have found many other attributions but they differ in some ways and many do not seem to agree with the source to which they are attributed. I am attaching a Word document which collects variations on the "75% within 1 mile but only 5% lit" statistic. You should know, however, that our further research with RHK has turned up a statement from them they believe the actual percentage of buildings lit by fiber in 2002 was around 11% (which may or may not include some buildings more than 1 mile from fiber). I'm also attaching an RHK report from 2002 which may be of at least historical interest to you. I'm afraid that's the best we can do.

I hope our difficulty in running down this information has not held up the item. Please let me know if there is anything else you need from us.

<<Facts and Figures on Proximity to Fiber.doc>> <<RHK News Outlook -- Special Report on Access Networks.pdf>>

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<http://www.usatoday.com/money/covers/2002-04-11-terabeam.htm>

As a result, an estimated 75% of U.S. businesses are within one mile of a fiber-optic artery. Yet, just 5% tap in because the final link into a building, in most cases, remains undone, says research firm RHK.

http://www.opticsreport.com/content/article.php?article_id=1012

An estimated 75% of commercial buildings are within 1 kilometer of a major fiber trunk, but only 5% of these are connected to that trunk (RHK).

<http://www.networkmagazine.com/shared/article/showArticle.jhtml?articleId=8703393&pgno=3>

According to analyst firm RHK Research (www.rhk.com), only 5 percent of U.S. businesses have a fiber connection, even though 75 percent are within one mile of a fiber backbone.

http://telephonyonline.com/optical/infocus/telecom_costeffectively_extending_fiber/

It has been estimated that 75% of businesses are within two miles of fiber. Still, up until now, even this proximity has not helped many businesses, considering only 10% are actually connected to it.

<http://www.eweek.com/article2/0,1759,1243383,00.asp>

According to RHK telecommunications research firm, just 5 percent of U.S. businesses are connected to the Internet by optic fiber, but 75 percent are within one mile of fiber.

http://www.atis.org/atis/atisinfo/USTA_Yossi_Saad.pdf

Despite aggressive deployment of fiber, today only 11% of businesses are served by fiber. This is expected to grow to 38% by 2005 (RHK 1/2002, US only data)

<http://www.wired.com/wired/archive/9.08/novalux.html?pg=3>

According to US West, 85 percent of US companies are within a mile of a

fiber trunk, but only 2 percent have direct access to the fiber.

Snapshot

Summary

The gap between T1/E1 and T3/E3 access service creates a market opportunity for service providers willing to provide N x T1 access to SMBs.

Fiber deployment leaves SMBs behind

SMBs have not been a key consideration when service providers deploy fiber-to-the-building. Top-tier corporate enterprises are seen as the core market for T3 access over fiber.

Fiber reach will remain limited

Fiber-to-the-building deployments have been rolled out to approximately 750,000 buildings in the United States, leaving an un-served population of 89 percent.

Related Analysis

Industry Report: *Availability of Fiber to Buildings in Qwest's Local Territory, North America*, December 2001.

The 'Bandwidth Chasm' for High Speed Service Access

Executive Summary

The 'bandwidth chasm' between T1/E1 and T3/E3 is a neglected market opportunity

Communications are the foundation of modern business, from e-commerce to extranets, design collaboration, internal distribution, staff training, and multimedia production. These applications are essential to both enterprises and many small and medium businesses (SMBs), driving ever-increasing demands for fast, efficient and reliable access to the Internet and remote offices.

The requirement is for a ubiquitous access network that can reach corporate divisions, suppliers and customers wherever they are located. A T1/E1 line at 1.44Mbps (this report refers to T1 as the North American access standard. These references also apply to the E1 standard used elsewhere, unless specified otherwise). is the basic unit of transport in the local access network, providing both customer access and connections between the operator's own network equipment. But bandwidth demands have increased dramatically in the last mile and the standard T1 connection is often insufficient. Even smaller SMBs are seeing their needs grow beyond a single 1.44Mbps connection, especially in industries such as media, design and supply-chain manufacturing. However, the step up to T3/E3 (45Mbps) rate is too steep in terms of price and bandwidth for most companies.

Service providers have a significant market opportunity in pent up demand for connections between T1 and T3 rates, delivered either over copper or fiber. The typical migration path for a fast-growing business customer is to start with a single T1 then move on to multiple T1s. Realistically, many enterprises will never require a 45Mbps connection, yet service providers tend to put customers into 'T1' or 'T3' buckets. The purpose of this report is to examine how service providers can better address this neglected market for n x T1 access. We will look at demand for high-speed access services at speeds greater than 1.44Mbps; deployment trends for T1 and n x T1; and deployment forecasts for fiber to the building.

Fiber deployment strategies leave SMBs behind

T1 access can be delivered over fiber or copper. Fiber is the preferred media for connection at T3 rates and above, but it is yet to be widely deployed in the access network and new deployments are costly. Copper, on the other hand, is ubiquitous, connecting the operator's wire-center to nearly every business and home and supporting data rates between T1 to T3.

In the United States, Regional Bell Operating Companies (RBOCs) provided 647,502 fiber-based T1/DS1 terminations at the customer premises in 2000, according to the Federal Communications Commission's ARMIS database. RHK estimates there is an equal number of copper-based T1 access lines, suggesting a total of about 1.3 million T1s terminating at customer premises. T3 alternatives require a fiber connection to the building, but this often involves considerable investment in outside plant construction. In

2000, RBOCs provided 89,490 fiber-based DS3 terminations at customer premises, according to ARMIS data adjusted by RHK. (Note, this paper uses T1 and T3 to identify the transmission circuits to the customer premise. These circuits terminate equipment that delivers DS1, DS3, or data interface ports to the customer.)

Operators began deploying fiber to the largest businesses in the early 1990s. However, the roll-out strategy mostly neglected the SME market which was considered less worthwhile without strong demand for T3. In general, SMBs present challenges for service providers traditionally focused on large corporate accounts, especially larger operators and ILECs/PTTs. Typically, SMBs lack insight into future bandwidth needs. They tend to experience sudden changes in the business with associated step increases in bandwidth requirements. Also, long fiber construction cycles are often impractical for these fast-growing companies.

For large service providers, the key market is for access ports at DS3 and higher. These deployments are increasing at CAGR of 18 percent and RHK expects this rate to continue through 2006. Although the trend is for enterprises to migrate from T1 to T3, there is no apparent slow down in demand for T1 access as new deployments continue to increase at 25 percent per year.

Table 1 shows the pricing comparisons presented to enterprises when migrating from a DS1 line to a DS3. Based on pricing from BellSouth and Verizon, it can be seen that the cost of a DS3 connection is typically equivalent to between 11 and 12 DS1 access circuits. This large jump between the two rates, in terms of price and bandwidth, leaves a substantial market open for N x T1/E1 services.

Table 1: Crossover from DS1 to DS3 access

| BellSouth two-mile access | | | |
|----------------------------------|-----------------|-------------------|---------------------------------|
| Service component | DS1 | DS3 | Crossover DS1 to DS3 |
| Local channel per month | \$121.57 | \$1,515.55 | 12.5 |
| Facility termination per month | \$68.89 | \$972.54 | 14.1 |
| Distance charge for two miles | \$30.40 | \$194.50 | 6.4 |
| Total | \$220.86 | \$2,682.59 | 12.1 |
| Verizon two-mile access | | | |
| Service component | DS1 | DS3 | Crossover DS1 to DS3 |
| Facility termination per month | \$198.24 | \$2,667.50 | 13.5 |
| Distance charge for two miles | \$70.00 | \$310.06 | 4.4 |
| Total | \$268.24 | \$2,977.56 | 11.1 |

Source: RHK

Fiber deployments will increase, but reach remains limited

Fiber is the preferred media for high-speed service access and the process of migration to fiber will continue until most buildings connected. So far, progress on new fiber access

links is modest and RHK believes that fiber to the building construction will continue until after 2010. This creates a long-term opportunity to deliver high-speed services on copper pairs to buildings not yet connected by fiber.

In RHK's *Industry Report: Availability of Fiber to Buildings in Qwest's Local Territory* it was estimated that the ILECs as a group offer fiber to approximately 11 percent of the 750,000 buildings in the United States, leaving an un-served population of 89 percent of the buildings. The number of buildings is growing at the rate of 0.67% per year according to the Small Business Administration.

Table 2 below shows a forecast for high-speed access deployments via fiber and copper. As deployment migrates to second tier buildings, operators will encounter more multi-tenant buildings requiring multiple service terminations per fiber. Since each customer requires a dedicated connection to the network, this means that the customer terminating ports will grow faster than the number of buildings served by fiber.

Table 2: Forecast of high-speed service using fiber and copper

| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | CAGR 2000-2005 |
|------------------------------------|--------|--------|--------|--------|--------|--------|----------------|
| Fiber ports added (DS3 & above) | 29542 | 27046 | 31896 | 41343 | 53760 | 70120 | 16% |
| Copper ports added (> T-1) | 16639 | 27128 | 41811 | 59664 | 75844 | 79319 | 30% |
| Installed base of fiber ports | 89490 | 116536 | 148432 | 189775 | 243535 | 313655 | 24% |
| Installed base of copper ports | 42282 | 69409 | 111221 | 170885 | 246729 | 326048 | 42% |
| # buildings served by fiber | 89490 | 114251 | 142723 | 179033 | 225495 | 285141 | |
| # of buildings not served by fiber | 665535 | 645833 | 622454 | 591270 | 549969 | 495519 | |

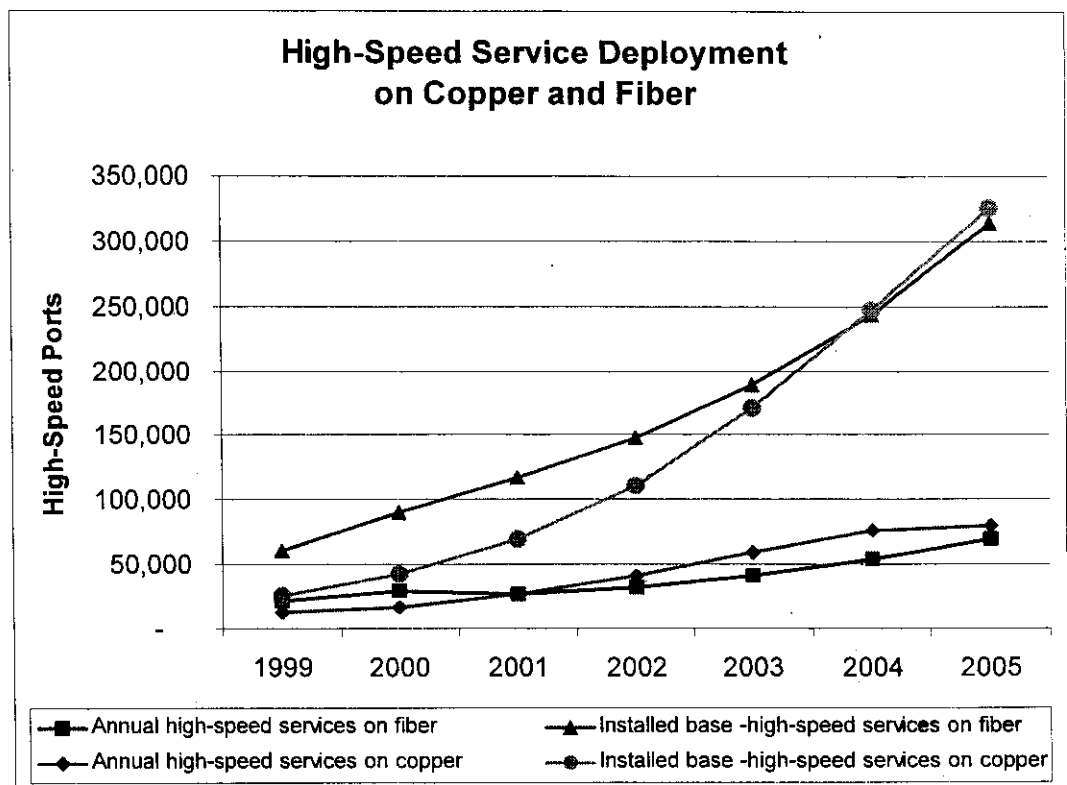
Source: RHK

Further Analysis

Figure 1 below illustrates the annual and cumulative deployment of high-speed service ports on fiber and copper according to RHK and based on data from the FCC's ARMIS database. In 2004 service on copper overtakes service on fiber due to the higher deployment rate on copper. RHK believes the relative ease of service provisioning on copper will drive aggressive deployment of N x T1/E1 services over this medium. Note that copper growth slows down in 2005, due to a decrease in the population of un-served buildings, but presents a mid-term opportunity.

The American forecast can also be extrapolated for international applications. Historically non-US network requirements lag those of the US by one or two years. E1 (2048 kbps) transmission links to customer premises currently provide service access over copper or fiber. While the international communities do not make as much use of voice private networks, they have similar needs for high-speed data service access for company data networks and access to the Internet.

Figure 1: High-speed service on copper and fiber



Source: FCC's ARMIS and RHK

Summary

The market for N x T1 access offers great opportunity for service providers to address a largely neglected SMB sector. For many of these companies, the step up to T3 rates is too steep. Fiber deployments are growing and can support T3 speeds, but at a cost that is more appropriate for large corporate entities. However, not every service provider is able, or willing, to support SMB customers. These smaller companies tend to change their bandwidth and service needs rapidly, and their relatively small account size means this segment requires close attention. By looking at fiber deployment patterns, cross-referenced with data on SMB trends, service providers prepared to go the extra (last) mile have an under-served market they can target.

Information current as of January 27, 2002